Directing differentiation of stem cells using cell-imprinted culture platforms

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Directing the differentiation of stem cells in the lab has huge therapeutic potential, such as producing cell types for cell and tissue-based replacement therapies. Most current methods for stem cell differentiation use expensive chemicals and are not always 100% effective. In recent years, engineering cell culture substrates and the use of surface topography have become more popular as alternative ways to induce stem cell differentiation[1, 2]. Stem cell differentiation has also been studied on substrates with cell-imprinted pit-like surface features[3, 4].

In this work we present the use of polystyrene (PS) culture platforms with pit-like and raised cell-imprints (also known as bioimprints) to guide the differentiation of stem cells. Bioimprints are a 3D replica of cellular morphology onto a rigid material and can be negative or positive, as shown in figure 1. In positive bioimprints, cell-imprints look exactly like cells and mimic the natural physical shape of cell environment, producing a more desirable outcome towards directing stem cell differentiation.

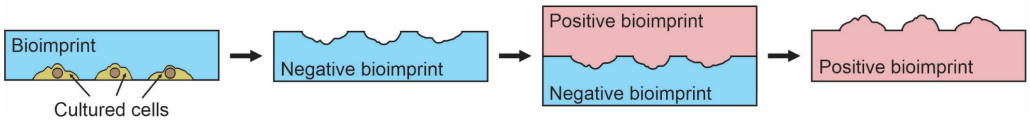

Figure 1. A schematic image showing the difference between negative and positive bioimprints.

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